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Human Systems IAC

GATEWAY

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Usability and Usefulness: Achievements Fraught With Challenges

Joyce A. Cameron

The idea of people using tools and technology is central to the thinking of people engaged in human factors engineering (HFE) and human systems integration (HSI). Historically many such people have been concerned with physical form, fit, and function. Could users, both operators and maintainers, reach? lift? perform necessary tasks without the use of potentially injurious postures? etc. The increasing importance of cognitive tasks has led to more cognitive questions related to topics such as attention, situation awareness, and cognitive workload.

Numerous books and articles have been written about use-centered design and about user-centered design. Numerous documents have espoused the importance of usability and usefulness. Numerous tools and techniques have been developed to aid in these endeavors. Some have been developed in the context of commercial product development; others have been developed in the military research and development and acquisition domains. Yet, challenges and opportunities remain for those engaged in designing and developing useful and usable systems.

The articles in this issue of *GATEWAY* focus on some of these challenges and opportunities. They do not look at "usability" in terms of *what* it is. To do so might be perceived as "preaching to the choir" in a publication devoted to human factors and to HSI. They do not look at *how* to improve usability in terms of available tools and techniques. Instead, they describe challenges facing human system practitioners involved in the development of new computerized technologies.

The article by Samuel Hawkins suggests that HFE is "a technology-enhancing discipline rather than a technology-creating one," and he notes that the events of 9/11 have brought new challenges and new opportunities to help enhance human performance. The article by Gilbert Bandry focuses on the challenge resulting from the increasingly widespread use of commercial-off-the-shelf (COTS) equipment in major Department of Defense (DoD) acquisition efforts. The article by Joyce Cameron looks at a qualitatively different type of challenge—that associated with the communication, cooperation, and collaboration needed for practitioners from different disciplines to work together to serve the needs of the end-user. The final article by Tom Metzler, Director of Human Systems Information Analysis Center (HSIAC), describes some of the rethinking that we are doing at HSIAC to redesign our website to be more usable and useful to practitioners and researchers alike. ■

inside:

The Human Systems IAC is a United States Department of Defense Information Analysis Center administered by the Defense Technical Information Center, Fort Belvoir, VA, technically managed by the Air Force Research Laboratory Human Effectiveness Directorate, Wright-Patterson Air Force Base, OH, and operated by Booz Allen Hamilton, McLean, VA.

Human Factors Challenges
In the Post-9/11 World

Samuel Hawkins

The events of September 11 were so shocking that virtually every American industry and discipline has felt the impulse to ask itself, "What can we contribute to the prevention of future tragedies?" Human factors is no exception. As our nation faces the challenge of rapidly adopting and adapting to, in the words of FBI Director Robert Mueller, "new strategies, new technologies, new analytical capacities and a different culture…," (Mueller, 2002) our discipline has the opportunity to examine what our accumulated knowledge base concerning human capabilities and our interaction with technology can contribute. This article provides a brief look at four areas to which human factors can contribute: aviation security, biometrics, information systems, and the military.

Aviation Security

Norman Mackworth's World War II work with Royal Air Force radar operators shows that human performance of tasks requiring sustained attention decrements over time is a cornerstone of our discipline. For decades airport security monitoring has been a textbook example of a difficult sustained attention problem, and the potential human factors engineering (HFE) contribution to improved aviation security was no doubt an early thought to many HFE professionals in the days immediately following 9/11. As recent articles (e.g., McDaniel, 2002; Hancock & Hart, 2002) have made clear, HFE has a large body of well-understood knowledge that can, and is, being applied to this issue.

But post-9/11 suggestions for technology improvements to advance aviation security extend well beyond the metal detector. In addition to the applications of biometrics discussed below, a host of potential on-aircraft measures, such as cabin video surveillance and wireless communications links for flight and cabin crews (including Air Marshalls), bring with them the traditional human factors issues regarding form, fit, and function. Moreover, considerations of more radical alteration to the current pilot-in-control paradigm have even greater requirements for attention to human factors. Proposals for enhanced use of automatic obstacle avoidance and/or ground control of the aircraft invoke complex issues of human interaction with automation. No successful implementation of such radical technology solutions will be possible without consideration of HFE issues such as mode awareness and mistrust of automation.

Biometrics

Biometrics have received increasing visibility after 9/11. The use of technologies that scan and match individual characteristics, such as fingerprints, hand geometry, iris structure, retinal patterns, and written signatures, will no doubt increase as needs for improved identity verification and detection arise. Thus far, the primary consideration of the human in this area has revolved around the concern for privacy protection and civil liberties. HFE has a role to play as these issues are resolved and the technology proliferates. We can assist in ensuring that specific applications are sufficiently unobtrusive and/or usable to win public acceptance, and sufficiently usable by personnel of confirming agencies for the overall system to be effective.

Information Systems

As information about pre-September 11 "clues" to the terrorist attacks have surfaced, there has been an understandable desire throughout the public and the government to ensure that our intelligence and law enforcement agencies have the type of access to data that would enable them to anticipate and prevent terrorist activities. One response has been to seek a substantial increase in the ability of intelligence and law enforcement organizations to share information within and across their communities more easily.

The tasks of the intelligence/law enforcement community form, on the one hand, a classic human performance challenge of the type that cries for the implementation of more and better HFE. The environment presents to analysts and decision-makers multiple information cues of wildly varying reliability. Time stress is tremendous. There are competing organizational and resource pressures, and all decisions are made against a background of great uncertainty. HFE professionals with an information-processing and decision-making perspective will no doubt immediately recognize that this job description includes numerous naturalistic decision-making challenges. In short, the field is saturated with the types of tasks that are conducive to human error.

On the other hand, the field is highly dependent on the experienced judgment of its members, and it will remain so. The opportunity for HFE contribution to the intelligence community lies in the current imperative to ensure that all available information is shared within and across intelligence organizations. The urgency to "break down the stovepipes" that can isolate potentially critical intelligence is certainly understandable and justified. However, another cornerstone of our discipline's knowledge base is the understanding that "more" information is a two-edged sword. Data must be processed to have worth as information. The design of the vast databases of information that will result from collectivization of our nation's intelligence data will require consideration of human and organizational limitations if they are to be the types of knowledge tools that will be required to effectively coordinate U.S. responses to Homeland Security threats.

Military

Though HFE applications to new areas of technology will likely increase in the coming months and years, the historically strong linkage of HFE to the military will continue. Even prior to 9/11, the Department of Defense (DoD) was facing significant self-proclaimed transformational challenges. Increased operational tempos, greater reliance on digital communications and precision weapons, and new needs for information integration and decision support are all part of the military's mission against terrorism, and HFE efforts will become more focused in improving the technology that impacts these areas.

Several of the military's key transformational goals outlined in the recent Quadrennial Defense Review, (e.g., conducting effective information operations and leveraging information technology to give U.S. joint forces a common operational picture) will depend heavily on the transforming technologies becoming "basic issue" to our personnel. For these goals to fully succeed, these emerging technologies must be tailored to the capabilities of their users. As Secretary of Defense Donald Rumsfield (Rumsfield, 2002) has said,

> *…if you could go back in time, and give a knight in King Arthur's court an M–16 [and]…he takes that weapon, gets back on his horse, and uses the stock to knock his opponent's head, it's not transformational. Transformation occurs when he gets behind a tree and starts shooting.*

Fortunately, the proliferation of home computing devices in the past decade has provided a tremendous head start in making this transformation. As Deputy Defense Secretary Paul D. Wolfowitz has said regarding the capability for computers, instant communications, and global networking to transform the U.S. military, lessons learned from operations in Afghanistan show that today's soldiers

> *…display an agility with that technology that comes from being completely comfortable with this new way of doing things (Wolfowitz, 2002).*

However, the HFE community must not allow this increase in comfort and ease with technology to allow others to assume that the "user interface problem" has been solved. Rather, the greater computer skills that recruits now bring with them make it possible for us to push toward more optimal technology solutions. This upward shift in target audience capabilities should enable HFE to move from simply accommodating human limitations to leveraging human capabilities. Whereas the initial wave of HFE efforts aimed mostly at ensuring that interfaces were sufficiently simple that users would not reject them, we are now progressing towards making interfaces that optimally integrate the human within the system to produce the maximally effective tools necessary to meet the challenges of information-saturated warfare.

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The Department of Defense and Human Factors Engineering: Changing With the Times

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Historically, the interaction between the U.S. Department of Defense (DoD) and Human Factors Engineering (HFE) has been synergistic (Moroney & Bittner, 1994). In this relationship, the DoD has served as a strong advocate of HFE, contributing significantly to basic and applied research and championing the role of HFE in the product development process.

In this relationship, the role of HFE has evolved as technology has evolved, with each major change bringing additional issues to view (e.g., automation, cognitive workload, etc.) As computing technology has proliferated throughout the military, new sets of tools are being developed to facilitate consideration of human factors issues during the process of product design, thus helping ensure that user needs are not lost in efforts to provide increased functionality.

In the past, HFE in the DoD has been deeply involved in research and development to support unique weapons-related technology and products. Today, many weapons-related systems make extensive use of information technologies developed in the commercial world and available as commercial-off-the-shelf (COTS) equipment. This increasing emphasis on the use of COTS equipment brings new challenges to HFE practitioners.

Information technology is becoming increasingly available to friend and foe alike. In fact, the current version of DoD 5000.2–R, Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information Systems (MAIS) Acquisition Programs (Department of Defense, 2002) includes a section on "Commercial, Off-the-Shelf (COTS) Considerations" (C5.2.3.5.7). Several benefits are associated with the use of COTS including: "opportunities for reduced cycle time, faster insertion of new technology, lower life-cycle costs, greater reliability and availability, and support from a more robust industrial base" and Program Managers are advised to apply commercial "best practices" (C5.2.3.5.7.2).

However, the DoD 5000.2–R indicates that the use of commercial best practices can "require changes in the way systems are conceived, acquired, and sustained" (C5.2.3.4.7.2). The changes identified affect many aspects of system acquisition including the need for:

- Communication, negotiation, and flexibility to bridge gaps between commercial items and DoD needs,
- Evaluation of COTS items in terms of mission accomplishment and the match between commercial capabilities and system requirements, not in terms of the capabilities of the technology itself,
- On-going system engineering to accommodate changes in commercial items,
- Testing commercial upgrades to avoid unexpected side effects related factors such as safety, and reliability, and
- Testing COTS equipment to ensure that it does not pose risks to security or information assurance.

One place where the efforts to adopt commercial best practices and COTS equipment is visible is in the communications systems associated with weapons systems. As Navy Rear Adm. Robert M. Nutwell, Deputy Assistant Secretary of Defense for Command, Control, Communications, Intelligence, Surveillance, Reconnaissance (C4ISR) and Space has noted, "Without the commercial technology out there, we could never hope to achieve information superiority" (http://www.nationaldefensemagazine.org/article.cfm?Id=209).

HFE, like other engineering disciplines, is in the process of redefining its role within the new acquisition paradigm. As specified in DoD 5000.2–R,

Vendors react to the marketplace, not the unique needs of DoD programs. To successfully work with

vendors, the PM (Program Manager) shall adopt practices and expectations that are similar to other buyers in the marketplace. Traditional DoD acquisition and business models are not sufficient for programs acquiring commercial items, as they do not take into account the marketplace factors that motivate vendors.

(C5.2.3.5.7.2.3).

The shifting of the DoD focus from design oversight for unique one-of-a-kind systems to being an end-user of many kinds of COTS equipment is influencing the purpose of HFE initiatives. This is not to say that the limitations in potential for design influence should be seen as marginalizing HFE. Rather, as DoD 5000.2–R points out, "The keys to success involve thinking and acting as an informed consumer…" (C5.2.3.5.7.2). HFE needs to become a part of the informational process that allows the DoD to make appropriate purchases. Just as individual consumers making large or small purchases want to ensure that their purchases have the right form, fit, and function, HFE practitioners must strive to help ensure that the operators and maintainers of military systems are not overlooked simply because a system uses COTS equipment.

This point was made at the most recent meeting of the DoD Human Factors Engineering Technical Advisory Group (HFE TAG) May 2002, where it was stated that "human factors evaluation of nondevelopmental items" was a "hot issue" and that:

Policy should be established in all Services mandating HFE as a principal factor in selecting an item or system from a pool of nondevelopmental item (NDI) contenders. The policy should specify that contenders must meet essential HFE criteria to be judged acceptable.

(DoD HFE TAG, 2002, slide 29).

The HFE practitioner's role, however, goes beyond just recognizing good human factors practices in the design of COTS equipment, for the HFE practitioner must also help to ensure good human factors in the DoD environment. Military environments present a unique set of challenges to human performance—challenges that are not typically considered by commercial vendors. Thus, evaluations of COTS equipment need to take into account the types of environmental and cognitive stressors in the environments in which military personnel work. The HFE practitioner must also be ready to address the increasing number of situations in which military systems are maintained by nonmilitary personnel. In these instances, tailoring of HFE guidance, such as MIL–STD–1472, can help ensure that HFE requirements are appropriate to the environment and the mission, while still maximizing the ease of use for personnel.

System integration and DoD HFE practitioners can also work to optimize the use of COTS equipment after it has been selected. While it is to be hoped that the selection process produced a system that was maximally integrated, HFE practitioners will likely find opportunities to apply their skills in ensuring that a system with COTS products is integrated in a manner that optimizes human performance. COTS products, by their nature, tend to be modular, and HFE considerations must still apply in determining how a system of modular items will be configured for optimal use. For example, when working with communications systems, human factors considerations of lifting limits and accessibility must still be applied to determining where and how COTS telecommunications items are mounted in racks.

HFE practitioners have long waged a vocal battle to be included early in the design process. The necessity of early involvement has become something of a mantra for the discipline. The need for HFE within the design of products is by no means eliminated by an emphasis on COTS products; it simply means that HFE input is likely to be needed prior to the design reaching the attention of the HFE practitioner employed by a system integrator. It means that an important part of the end-user's HFE practitioner's role is likely to ensure a vigorous inclusion of HFE in the product selection process. Marketplace mechanisms are likely to force better HFE solutions to emerge from the commercial design process, and the fact that the DoD is a customer that cares about HFE may prove to contribute substantially to effective consideration of HFE concerns. ■

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Cooperation and Collaboration Between Human Systems and Information Systems Personnel: A Crisis and An Opportunity

Joyce A. Cameron

Information and information superiority is becoming increasingly important in today's military environment, and the acquisition, processing, distribution, and storage of information has become dependent on advanced, technologically-sophisticated information systems. Yet, anecdotes depicting the challenges faced by human systems and information systems practitioners abound. Management and end-users agree to participate in the process of defining information system requirements, but become "too busy" as soon as there are real questions on the table. Software is built, then after the fact, information systems practitioners look at usability requirements. Information systems are deployed and only after howls of user dissatisfaction is (limited) usability testing conducted. Organizational structures arrange for human systems practitioners to interact with programmers, when interaction with system designers is needed. Contractual arrangements have human systems practitioners working for one contractor and information systems practitioners working for another, with communication limited largely to written documents exchanged through a common program manager. And the litany goes on.

Despite these difficulties, information systems practitioners have access to a growing repertoire of techniques to facilitate software process improvements (e.g., systematic tracking of requirements, modeling of user behavior, etc.). Human systems practitioners also have access to a growing repertoire of techniques to identify and analyze cognitive tasks, to contribute to information system design, and to inspect and assess usability, etc. Yet, too rarely do members of the information systems and the human systems communities of practice cooperate and collaborate in the definition, design, development, and deployment of information systems that users find both usable and useful.

This lack of effective collaboration between human systems and information systems practitioners became abundantly clear to officials from the Office of the Deputy Undersecretary of Defense (Science and Technology) during a briefing of proposed Advanced Concept Technology Demonstrations. During this briefing, which addressed the use of mature and maturing technologies to solve military problems, officials realized that the assessments of these technologies were structured to assess the effectiveness of system hardware and software. They were not structured to provide an equally rigorous assessment of the human performance associated with the technology being demonstrated. Given this situation, the Directors of Bio Systems and Information Systems in the office of the Director of Defense Research & Engineering (DDR&E) concluded that developers of Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems could benefit greatly from deliberate and expanded interactions between information systems (IS) and human systems (HS) technology professionals. By extension, developers of military information systems in general could also benefit by such cooperation and collaboration. And, in the commercial world, understanding the importance of usability is growing and spreading rapidly.

This insight led the Office of the Deputy Under-Secretary of Defense (Science and Technology)/ Bio Systems to task HSIAC to look at the problem of HS/IS cooperation and collaboration, to describe the current status, and to propose solution concepts to enhance the ability of members of these two communities of practice to work together to the benefit of end-users whatever their specific role.

To proceed with this task, HSIAC personnel used a multi-pronged data-gathering strategy that included: an extensive literature review; a workshop for scientists, engineers, and military opera-

tors/analysts that included both presentations and participant deliberations; and subject matter expert (SME) interviews. The goal was to characterize the nature of the problem associated with HS/IS cooperation and collaboration; to identify recurrent themes used to characterize current practice; to locate best practices currently in use, and, finally, to synthesize these findings to support recommendations to institutionalize and facilitate enhanced cooperation and collaboration between HS and IS researchers and practitioners.

Regardless of the data source (literature, workshop, and interviews), the overall assessment of current state of HS/IS cooperation and collaboration was about the same:

- Successful HS/IS cooperation and collaboration is possible, but currently it is very rare.
- Cultural and organizational challenges to successful HS/IS cooperation and collaboration are numerous, multidimensional, and interdisciplinary in nature.
- Improvements will have to address the issue of HS/IS cooperation and collaboration from multiple perspectives. There is no single, "magic bullet."

During the HS/IS Cooperation and Collaboration Workshop, several case studies illustrating successful HS/IS cooperation and collaboration were described. Details and terminology varied according to the service and the system, but several themes were evident:

- The need for clear roles and responsibilities for both HS and IS practitioners,
- The importance of leadership committed to the need for HS/IS cooperation and collaboration, and
- The use of a design process driven by human-centered, task-related requirements not by data-based requirements.

The cultural challenges identified during the several different data-gathering efforts were numerous and varied. Fundamental to all of the challenges to HS/IS cooperation and collaboration is the lack of any common understanding between the HS and IS communities of the potential value-added by HS/IS cooperation and collaboration.

Exacerbating this lack of a common understanding is the pervasive use of acronyms and the frequent discipline-specific definition of apparently common terms. For example, the acronym "IS" has at least 41 meanings including information system(s), information security, information services, information superiority, interface specification, interim standard, and internet service. The acronym "HSI" has at least 20 meanings including human systems interface and human systems integration. However, the listing of acronym meanings for "HS" does not include "human systems" as used in the Department of Defense (DoD) (based on data gathered May 28, 2002 at http://www.acronymfinder.com).

Complicating the situation even further is the fact that some of the constraints on HS/IS cooperation and collaboration work from the top-down (e.g., DoD policies). For example, according to a recent report published by the United States General Accounting Office (2001), funding is a major hurdle in the DoD. Despite policy revisions to facilitate the development of better systems, the mechanism for obtaining funding has remained virtually unchanged. Requirements must be set before a program is approved, and a program must be approved in order to obtain funding, and funding is essential to support systems engineering efforts. As a result, those who define requirements and those who engage in systems engineering are often on opposite sides of essential product launch decisions. The time elapsed between the time initial requirements are drafted and the time systems engineering discovers major gaps in the requirements may be so great that there are few options available except to increase cost and/or slip the schedule. Ironically, many proven human factors analyses and end-user involvement techniques that can be used to help define and refine requirements cannot be used until the product developer receives payment to perform such procedures. The result is that a project may be funded based on requirements compiled with limited end-user input, and the potential contribution of HS practitioners is diminished because of DoD funding policies and the restrictions imposed by them.

While funding processes and procedures can have the effect of restraining HS/IS cooperation and collaboration from the top down, still other constraints on HS/IS cooperation and collaboration work from the bottom up. Issues related to the meaning of words are perhaps even more pervasive than the challenges due to the potential con-

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Human Systems Information Analysis Center (HSIAC)

Customer Questionnaire

A recent survey was distributed to all of the Human Systems Information Analysis Center (HSIAC) domestic customers. This survey will be used to evaluate the quality of services and products provided by the HSIAC.

Please take a moment to complete the survey and send back to the HSIAC via hard-copy, electronically, or at our website http://iac.dtic.mil/hsiac/index.htm. Your input will enable us to improve our services and determine how to better serve you.

Concept of Operations: Web-Based "Customer" Support

Thomas R. Metzler
HSIAC Director

As a result of recommendations from our Steering Committee, we are changing our website. We have concluded that just converting newsletters and brochures into HTML is not enough. The real currency of websites is not how much we jazz them up—it's the results we get from them. We need to be asking ourselves how will we build a web-based "customer" support capability?

To realize the potential of the web for customer support, we must be willing to commit to the care and feeding of a customer-led effort. We must offer our customers what they really want and need. We must take their view of the website and let them lead the way. We must organize our activities around our customers and allow them to help us set our direction. This is not a simple task.

Let us put ourselves in the shoes of one of our potential customers. An engineer at a major contractor needs information to influence the design of a computer-aided tool. If he or she doesn't obtain the information quickly, the design team will move ahead without pertinent human system information. Who, or what, should this person consult? A government office? A Military Standard? A government lab? A subject matter expert? If the engineer chooses to call a person, he/she may set off a chain of handoffs that will only delay resolution of the problem. Suppose one key person in the loop is off on a business trip or vacation. It's all too possible for the preceding person in the chain to leave a voice-mail or E-mail message and conclude, "I did my job. I passed it on."

The immediate goal is to deploy a revised website, establish relationships with customers, and progressively entice the Human Systems community into the new structure. The intention is to provide them with an experience that makes them want to return for more. The long-term objective is to get customers to use the Human Systems Information Analysis Center (HSIAC) website as their "one-stop solution" when they have questions or problems pertaining to Human Systems Integration (HSI).

The temptation to try to satisfy all customers simultaneously will be great, but the goal of a comprehensive web strategy is to go after the secondary and tertiary groups only after the high-priority groups are securely attached to the organization via the Internet. We need to help our important customers to become participants in the evolving capabilities of our website. Once they are on line, we can start leveraging their participation into something more powerful. These key customers can then become partners who will guide us in making strategic decisions that will benefit all customers. They will help lead us; our job will be to keep up with them.

The things that are important to customers can be characterized by eight "C" words:

- **Content**: I want deep content, and I want to be able to mine it to get what I'm looking for.
- **Convenience**: I can get what I'm looking for quickly and intuitively.
- **Community**: I can meet and interact with people like me.
- **Commitment**: I want to know that you will help me in the future—if you don't have what I'm looking for, that you'll get it for me.
- **Customization**: I want to see what I want, I don't want to see what I don't want—most of the time.
- **Continuity**: In forums and other types of interactions I can go from one session to the next easily and pick up the thread, no matter how much time has elapsed.
- **Control**: I want to control our relationship. I want to turn it on or off, and anything you do with my information should be with my permission.
- **Confidentiality**: Customer's problems will not be made public.

We want to identify a small number of individuals (four to six) who are forward thinking, helpful, and willing to spend time with us. The more we know about the online habits of our customers—What engages them? What turns them off? The better we will be able to offer them something they want. Questionnaires can help, but the most important information will come from one-on-one conversations. Individual comments and personal suggestions from customers are very valuable. If you want to help, please contact me at tom.metzler@wpafb.af.mil.

Many organizations measure success by server statistics that count visitor "hits." However, we need to be clear about server statistics. A "hit" is a file that has been downloaded. Each image on a page is a file, as is each sound. When a page loads on a browser, the server registers one "hit" for each file. If the page has 43 unique images on it, the total number of "hits" recorded when the page comes up is 44, because the HTML file that describes the page and contains the text is also a "hit." If you refresh the page, you generate another 44 "hits."

More appropriate counts are the number of page views, unique visitors, and visitors who register. We also want measure how "sticky" our website is. Yes, this is a technical trade term. Stickiness is measured by the number of page views per visit or the amount of time a visitor (or repeat visitor) spends on the site. When we operate like an e-business, we should be asking other questions:

- What does it take to get site visitors to register?
- How deeply do they explore the site?
- At what point do they usually leave?
- Do they take advantage of the opportunities presented?
- Are they interested in meeting other people online?

We may need different scales for different customer groups.

Server statistics can help us measure success, but to get consistently useful results, we must continue to ask new questions and to challenge the meaning of our measurements. The evolutionary nature of the web may make today's measurements obsolete tomorrow.

Projecting into the future, we should be considering metrics such as, "How many customers would be upset if our website went down for an hour? a day? or a week?" "How upset are they now?" "How upset would they be" "What would they do if our site stayed down?" "How long would they wait before they looked elsewhere?" The more people depend on our site, the better. If our site goes down at 3:00 in the morning and our phones aren't ringing off the hook by 7:30 when we come to work, that's not a good sign.

On a content-driven site, everyone in the organization wants to monopolize the site for his or her own purposes. But a customer-led website leads us out of the woods by insisting that the content satisfies the customer first. We must expend the effort to guide new visitors on the path from initial curiosity to loyal users of, and contributors to, the site.

One of the most important commitments we are making to our customers is that, if they cannot find the answer they are looking for, we will work to find it and get back to them. We can help meet customer's requests for information, but in some cases that can take time. However, inclusion of interactive opportunities (e.g., bulletin boards) can enable customers to ask questions of one another and to build a community capable of supportive interactions with one another.

The most important thing we must build with our customers is trust. If people trust our website, they will tell their friends to rely on it, and we will succeed in growing a multitude of new customers. We are dedicated to enabling and helping our customers find the right answer.

If you have any comments on this proposal, please let me know. You can contact me at tom.metzler@wpafb.af.mil. ■

Supporting material for this article was provided by Eric Smith, NAVAIR Crew Systems Technology Business Manager.

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SAFE members represent diverse backgrounds and fields of expertise. Financially, SAFE depends solely on the dues of its corporate and individual members as well as the annual symposia. The Association has chapters located throughout the U.S. and abroad that meet and promote its goals and objectives. These chapters are a key element to the strength and growth of SAFE.

The Association's goals include stimulating safety and survival research and development. This is accomplished by means of an annual symposium, educational scholarships, association achievement awards, newsletters, and technical publications. SAFE strives to provide its members with opportunities for professional development, achievement, and recognition. Another important objective is to educate the public, industry, and the government to improve human effectiveness and safety in system designs and operation.

The SAFE Association's annual highlight is its symposium, which brings together a broad mix of technical personnel from all over the world, most importantly the users, to network and interact. It serves as a forum to promote new concepts and products, exchange technical information, and discuss special interest issues. Exhibits, technical papers, panels, **product demos**, outstanding keynote speakers, and workshops are all part of the symposium.

Over 45 years old, SAFE is a proud organization that welcomes new members and chapters to participate, contribute, and make a difference in the world of safety, survival, and life support.

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URL: http://www.safeassociation.com
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SAFE Association

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calendar of events

sep

Elephant and Castle, London, UK. September 2–6, 2002.
The 16th British HCI Group Annual Conference Incorporating European Usability Professionals' Association Conference 2002
URL: http://cise.sbu.ac.uk/hci2002/index.html

University of Southampton, UK. September 17–19, 2002.
Human Factors for Engineers Residential Course
Contact: IEE Event Services, Tel: +44 (0) 20 7344 5732/5733, Fax: +44 (0) 7497 3633,
E-mail: events@iee.org.uk, URL: http://www.iee.org/Events/g17sep02.cfm

Pisa, Italy. September 18–20, 2002.
Fourth International Symposium on Human Computer Interaction with Mobile Devices
URL: http://giove.cnuce.cnr.it/mobilehci02.html

Jacksonville, FL, USA. September 30–October 2, 2002.
2002 SAFE Symposium
URL: http://www.safeassociation.org

Baltimore, MD, USA. September 30–October 4, 2002.
HFES 46th Annual Meeting
Contact: HFES Office, P.O. Box 1369, Santa Monica, CA 90406–1369, USA/
Tel: +1–310–394–1811, Fax +1–310–394–2410, URL: http://hfes.org

oct

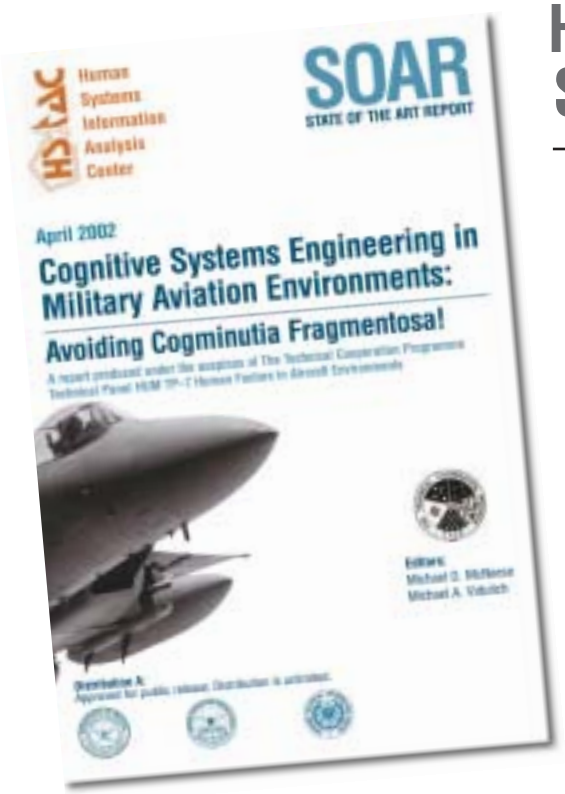
San Diego, CA, USA. October 7–9, 2002.
90th Annual Congress & Expo
Contact: National Safety Council, 1121 Spring Lake Drive, Itasca, IL 60143–3201, USA.
Tel. +1–630–285-–121, Fax: +1–630–285–1315, URL: http://www.nsc.org/expo02\call.htm

MIT, Cambridge, MA, USA. October 23–25, 2002.
HCI-Aero Human-Computer Interaction in Aeronautics
Contact: HCI-Aero 2002 Office, European Institute of Cognitive Sciences and Engineering (EURISCO), 4 Avenue Edouard Belin, 31400 Toulouse, France.
Tel: +33 (0) 5 62 17 38 38, Fax: +33 (0) 5 62 17 38 39, E-mail: hci-aero2002@onecert.fr
URL: http://www-eurisco.onecert.fr/events/hci-aero2002.html

dec

Orlando, FL, USA. December 2–5, 2002.
I/ITSEC Interservice/Industry Training, Simulation and Education Conference
Orange County Convention Center on International Drive
URL: http://www.iitsec.org/poc.htm

http://iac.dtic.mil/hsiac



HSIAC'S Newest State-of-the-Art Report

Cognitive Systems Engineering in Military Aviation Environments: Avoiding Cogminutia Fragmentosa!

Editors: Michael D. McNeese and Michael A. Vidulich

Chapters by: Robert G. Eggleston; Keith C. Hendy, David Beevis, Frederick Lichacz, and Jack L. Edwards; Eva Hudlicka and Michael D. McNeese; Michael McNeese; Neelam Naikar, Gavan Lintern, and Penelope Sanderson; Scott S. Potter, Emilie M. Roth, James Gualtieri, James Easter, and William C. Elm; John M. Reising; Robert M. Taylor, Michael C. Bonner, Blair Dickson, Howard Howells, Christopher A. Miller, Nicholas Milton, Kit Pleydell-Pearce, Nigel Shadbolt, Jeni Tennison, and Sharon Whitecross; and David Woods and Klaus Christoffersen

This report details the perspectives and foundations of an international community of practitioners who have both developed and applied cognitive systems engineering (CSE). One can see the field emerges from several corridors that in turn produce alternative methodologies/approaches to address military aviation domains. Differing philosophies and techniques spawn incisive pathways of integration in the development of design artifacts. Because the aviation domain is fraught with multifarious levels of complexity and is demonstrative of "cogminutia fragmentosa," we believe it supplies an excellent foundation for reviewing, assessing, communicating, and evaluating some of the principles (and nuances) inherent within various programs of CSE.

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…continued from page 3 "Human Factors Challenges In the Post-9/11 World"

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Summary

Of course, HFE issues existed in all these areas prior to 9/11, and in many cases HFE work was being vigorously pursued. As HFE is a technology-enhancing discipline rather than a technology-creating one, it is the increased emphasis in these areas and the need and desire to make them work with a much higher degree of reliability and efficiency that will provide opportunities for greater HFE input.

The ease with which HFE can be applied in these areas ranges along a continuum. For example, the airport screening task is in many ways an ideal model for HFE involvement: It involves a well-defined (though difficult to perform) task, a known environment, established technology, and a human performance challenge for which there has been extensive theoretical and applied research. The linkage between what we know as a discipline and what needs to be changed in the post-9/11 world will not always be so clear.

But as is always the case with technology systems, the human interface is inevitably there. Our knowledge has grown enormously in the 60 years since our discipline's involvement in the last World War. We now have the opportunity and obligation to apply what we have learned to a new type of conflict. ■

References

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3. Mueller, R. S. (2002). Press Release of response of FBI Director Robert S. Muller, III, to letter sent by Minneapolis FBI Agent, May 23, 2002.
4. Remarks prepared for Secretary of Defense Donald Rumsfeld, the National Defense University in Washington, D.C., January 31, 2002.
5. Prepared Statement by Deputy Secretary of Defense Paul Wolfowitz for the senate armed services Committee Hearing on Military Transformation, April 9, 2002.

…continued on page 7 "Cooperation and Collaboration Between Human Systems and Information Systems Personnel: A Crisis and An Opportunity"

fusion generated through the use of acronyms. For example, it is likely that HS and IS practitioners would give different answers to questions such as "What is a system?" "Is the human an essential part of the system or not?" "What is a human system?" "What is an information system?" "What is an interface?" "Is 'User-Centered Design,' designed by the users or for the users?" And the list could go on.

Given the complexity of the challenges to HS/IS cooperation and collaboration, it seems clear that there can be no single, "magic bullet" solution. Mandates concerning HS/IS cooperation and cooperation and the design and development of usable and useful information systems are needed as "sticks" to help ensure HS/IS cooperation and collaboration and widespread dissemination of realistic information about practices and procedures. Concurrently, better publicity of about successful HS/IS cooperation and collaboration is needed as a "carrot" to encourage adoption of these practices and procedures.

However, even well-positioned "carrots" and "sticks" cannot address challenges resulting from profound cultural differences and communications challenges. These latter types of challenges can better be addressed through education and training of groups from program managers, to bench-level scientists, to educators, and professional organizations. Additionally, shared tools and techniques, metrics and measures of performance are needed to help facilitate and justify HS/IS cooperation and collaboration.

Clearly we are faced with both great opportunities for improvement, and serious challenges to success. Hopefully, with effort, we can begin to improve communication and collaboration between HS and IS professionals realize the potential for the definition, design, development, and deployment of information systems that are both usable and useful. In such systems both the human-computer interface and the human-computer interaction will effectively support human information needs and real-world tasks because information and insight from both human systems practitioners and information systems practitioners have been incorporated from initial conceptual design to actual deployment. ■

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